

REMARKS

Please reconsider the present application in view of the above amendments and the following remarks. Applicant thanks the Examiner for carefully considering the present application.

I. Disposition of Claims

Claims 1-19 are currently pending in the present application. By way of this reply, claim 1 has been amended.

II. Claim Amendments

Claim 1 has been amended to more clearly recite the present invention. No new matter has been added by way of these amendments. Support for this amendment may be found, for example, in Example 1 of the specification as filed.

III. Rejection(s) under 35 U.S.C § 103

Claims 1, 2, 4, 5, 11-16

Claims 1, 2, 4, 5, 11-16 of the present application were rejected under 35 U.S.C. § 103(a) as being unpatentable over Japanese reference 11-010146 (hereinafter "JP 146") in view of U.S. Patent No. 4,761,234 ("Uemura"). Claim 1 has been amended. To the extent that the rejection may apply to the amended claims, the rejection is respectfully traversed.

The present application is directed toward a water treatment apparatus. The water treatment apparatus, with reference to the exemplary embodiment of the present

invention shown in Figure 1 of the present application, requires (as recited in independent claim 1 of the present application) a plurality of composite reverse osmosis membrane modules **5** and **11** arranged in multi-stages, where each of the plurality of modules **5** and **11** includes a porous support and a polyamide skin layer formed on the porous support, where the plurality of modules **5** and **11** include a final-stage module **11** and at least one pre-final module **5**, where a selected portion **7** and **10** of permeated water obtained from the at least one pre-final module **5** is supplied to the final-stage module **11**, and where the rest **6** of the permeated water is discharged from or recovered in the water treatment apparatus along with the permeated water **12** obtained from the final-stage module **11**.

Further, as amended, claim 1 recites that the polyamide membrane is treated with a free chlorine aqueous solution containing a bromine compound as described in Example 1, for example. According to this method, a polyamide membrane is formed without using a polyamine or polyacyl halide containing bromine, and thereafter, bromine is introduced into the polyamide membrane. By using the particular method claimed, the membrane has improved structural characteristics. Thus, as described in Example 1, of the present invention, a membrane having very good performance may be obtained.

Thus, in the present invention, as disclosed in Example 1 of the present application, after causing the reaction of the acyl chloride and the aromatic polyamine compound, treatment using a solution containing Cl_2 and NaBr is further carried out. *See* Specification, page 14, lines 30 – 32. Such treatment results in a polyamide layer comprising bromine atoms as is described below.

As noted in the previous responses and actions, JP 146 fails to disclose a pre-final module having a polyamide skin layer that comprises bromine atoms as required by

independent claim 1 of the present application. Uemura fails to disclose the limitation of introducing bromine into the polyamide skin layer by treating the polyamide skin layer with a free chlorine aqueous solution containing a bromine compound as recited in independent claim 1 of the present application.

Uemura suggests that a polyamide membrane may be formed using a polyamine or polyacyl halide in which bromine is covalently bonded to an aromatic ring. The Applicant respectfully notes that if a polyamine or polyacyl halide compound is used as the source for bromine, a polyamide membrane cannot be formed or, if it a membrane is forced to be formed, the membrane would have a large number of defects so that it would be capable only of a low rejection rate. This is because the reactivity degrades considerably when an electron-withdrawing group such as bromine is covalently bonded to an aromatic ring of the polyamine or polyacyl halide.

In contrast, by treating the polyamide membrane with a free chlorine aqueous solution containing a bromine compound, as in the present invention, this performance degradation is avoided.

In addition to the above, Uemura fails to disclose *boron* rejection as recited in claims 13 and 14, for example. For the reasons discussed above, a membrane formed in accordance with Uemura would not *inherently* possess the claimed rejection rates.

In view of the above, JP 146 and Uemura, whether considered separately or in combination, fail to show or suggest the present invention as recited in independent claim 1 of the present application. Thus, independent claim 1 of the present application is patentable over JP 146 and Uemura. Dependent claims are allowable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 3, 6-10, and 17-19

Claims 3, 6-10, and 17-19 of the present application were rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 146 in view of Uemura and further in view of U.S. Patent No. 4,046,685 issued to Bray (hereinafter "Bray"). For the reasons set forth below, this rejection is respectfully traversed.

Like JP 146 and Uemura discussed above, Bray fails to disclose all the limitations of independent claim 1 of the present application. Bray, which discloses a reverse osmosis apparatus having an elongated container housing a plurality of semi-permeable cartridges (*see* Bray, Abstract), is altogether silent as to a polyamide layer, and thus, necessarily cannot disclose a polyamide layer comprising bromine atoms as required by independent claim 1 of the present application. Thus, Bray fails to disclose those limitations of independent claim 1 of the present application not disclosed or taught in JP 146 and Uemura.

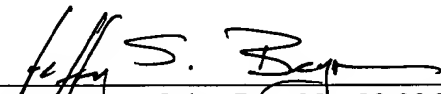
Thus, independent claim 1 of the present application is patentable over JP 146, Uemura, and Bray. Dependent claims 3, 6-10, and 17-19 are allowable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

IV. Conclusion

Applicant believes this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 04558.048001).

Date: 4/22/04

Respectfully submitted,


Jonathan P. Osha, Reg. No. 33,986
OSHA & MAY L.L.P.
1221 McKinney Street, Suite 2800
Houston, TX 77010

Telephone: (713) 228-8600
Facsimile: (713) 228-8778

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